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APPLICATION OF THE LOGISTICS POSTPONEMENT IN A RETAIL SUPPLY CHAIN OF WAL-MART. CURRENT EFFECTS AND FUTURE TENDENCIES

Summary: The application of new logistical concepts, supported by the intensive use of the advanced information and communication technologies contribute to improving supply chain performance. The significantly positive impact of the combination of logistics and ICT on supply chain performance may be observed in a retail industry.

The leading logistical concepts which improved the market position of retail supply chains are a logistics postponement strategy. The practical application of the strategy resulted from the improvement of the customer service level, reducing the costs of logistics operations and higher revenues. The implementation of the postponement strategy should be supported by the operational logistics techniques and modern technology.

This paper explores the effects of the dynamic development of innovative logistical concepts, specifically logistics postponement strategy supported by the use of information technology in a retail supply chain. The paper also presents the major tendencies that may occur in future and have an impact on the operational environment of retail supply chains.

Key words: logistics, postponement strategy, retail supply chain, Wal-Mart.

1. Introduction

Various definitions of a supply chain have been offered in the past several years, as the concept gained popularity [Cooper, Ellram 1993, p. 13-24; La Londe, Masters 1994, p. 35-47]. For the purpose of this paper the supply chain is defined as a set of three or more companies directly linked by one or more of the upstream and down-stream flows of products, services, finances and information from a source to a customer [Mentzer (ed.) 2001]. One type of supply chain is a retail supply chain, whose major distinguishing characteristic is a well-developed and very complex distribution logistics network. Currently it is more common for commercial companies to take control over the logistics processes and to initiate necessary changes. Some years ago manufacturers constituted important central nodes in supply chains where almost all physical flows were concentrated. **Over the years the position of manufacturing companies as a link in supply chains has changed.** At present the power of manufacturers becomes much smaller and the importance of commercial companies grows significantly.

Several authors have commented on the shift in power to the retailer and identified the following factors as drivers for the shift: controls over national brand price promotions, advances in information technology for production, distribution and product delivery, evolutions of retailer format, demand for shorter lead time to fulfill consumer purchase patterns, growth of store brand development and national brand manufacturing of store brands and mergers, acquisitions, consolidations [Fratto, Jones, Cassill 2006, p. 387-404]. The retailers are facing increasing pressure from all fronts. The competition is getting tougher, customers are more discerning and demanding, and the traditional barriers between products and services are disappearing [*Customer loyalty...* 2004]. The shift in power to the retailer and the influence of the ultimate customers and competitors motivated the mass merchandisers and other large retailers to change the nature of logistics leading to what some have called the Wal-Mart effect, by demanding customized or tailored logistics systems to meet their particular needs. The retailers require scheduled deliveries, special pallet packs, advance shipment notice, cross-docking capability, and so on [Coyle, Bardi, Langley 1996]. In consequence, large commercial companies started to initiate and implement innovative solutions in their supply chains which contribute to surviving and thriving in the competitive environment.

In a supply chain context innovative concepts involve changes in product, process, or service that either reduce cost or improve efficiency; the notion of efficiency includes increased end-of-chain customer satisfaction [Roy, Sivakumar, Wilkinson 2004, p. 61-79]. The implementation of innovative solutions allows supply chains to devise a customer-oriented product flow. Customer service plays a crucial role in the retail industry. In the opinion of M.C. Cooper and M. Christopher, one of the most innovative concepts for the structuring of supply chains is a postponement strategy [Christopher 1992].

2. The concept of logistics postponement in a traditional retail supply chain

The strategy of postponement has been discussed for over five decades. However, it has been only about 15 years since academics began to study the concept. The increasing number of publications offers innovative and diverse approaches to the postponement issues.

Growth in postponement is partially reflective of the increased demand for customized products. In order to enhance product offerings, many organizations are altering their supply chains to accommodate a mass customization process [Su, Chang, Ferguson 2005, p. 305-318]. It should be noted that postponement and mass customization are distinctly different and the terms should not be used inter-changeably. Nevertheless, the postponement is a method which facilitates the mass customization concept in practice.

One of the most general and widely adapted definitions was presented by R. Van Hoek who states that postponement is an organizational concept whereby some of the activities in the supply chain are not performed until the customer orders are received [van Hoek 1998, p. 508-523]. It should be underlined that the activities in supply chains cannot be postponed forever. The extent of the postponement depends very much on the environment where organizations operate¹. R. Van Hoek noticed that the competitive environment can be expected to have an impact on the relevance of postponement [van Hoek 1998, p. 508-523].

There are many attempts of classification of the postponement strategy in literature. Most authors argue that postponement strategy is a specific combination of the three generic types of postponement introduced by D.J. Bowersox and D.J. Closs: form, time, and place postponement. Form postponement refers to the postponement of final manufacturing or processing activities. Time and place postponement when applied in combination are referred to logistics postponement [Bowersox, Closs 1996]. Logistics postponement is delaying the forward movement of goods as long as possible (until the customer orders have been received) in the chain of operations – time postponement and keeping goods upstream in storage at central locations in the distribution chain – place postponement [Yeung et al. 2007, p. 331-356].

The level of postponement can be assessed as the scope of activities postponed and the impact of these activities on the finished products, which can be assessed in terms of place, form and function of the product. This scale correlates to the positions of the Material Decoupling Point (MDP) along the supply chain [van Hoek 1997, p. 63-75]. MDP is a point in the product axis to which the customers' order penetrates. It is where order driven and forecast driven activities meet. The Material Decoupling Point is a buffer between upstream and downstream players in the supply chain. This enables them to be protected from fluctuating consumer buying behaviour and therefore establishing smoother upstream dynamics, while downstream consumer demand is still met via a product pull from the buffer stock [Mason-Jones, Towill]. The strategic position of the Material Decoupling Point depends very much on the product type, consumer demand and supply chain adopted [Kisperska-Moroń 1999]. Logistics postponement (both time and place postponement) should be referred to the Delivery to Order (DTO) point. The idea of logistics postponement from the perspective of the location of delivery to order point is presented in Figure 1.

Figure 1 suggests that the Material Decoupling Point is at a central warehouse. In this concept the products are manufactured and shipped into the distribution centre on the basis of the forecast. However, the products are not moved to the specific retail node until a customer order has been received. The position of delivery to order point in the retail supply chain is consistent with the governing principle, saying that

¹ Authors, who studied the concept of postponement consider several factors determining the application of the strategy. Those determinants can be generally classified into two major groups of product-related and market-related factors. See: [Pagh, Cooper 1998, p. 13-33].

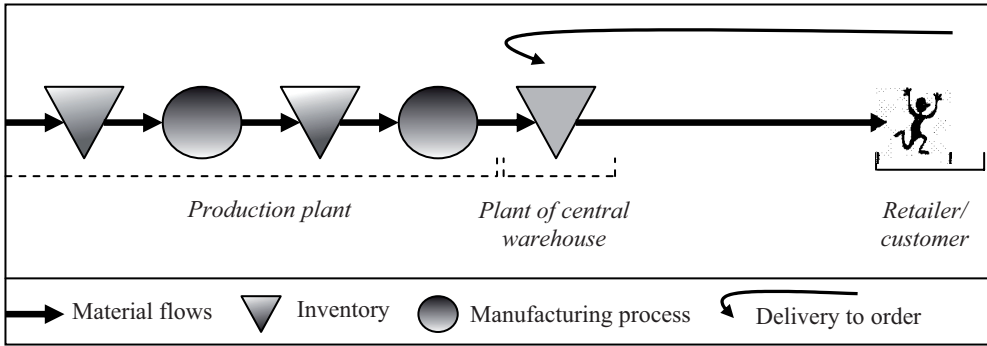


Fig. 1. Logistics postponement strategy

Source: adapted from: [Mason-Jones, Towill 1999, p. 13-26].

the Material Decoupling Point should always be moved as close to the end customer as possible, thereby ensuring the shortest lead-time for the customer. This approach also enables full capitalization of the benefits of divorcing the customer variability from the demands placed on the majority of players in the supply chain [Mason-Jones, Towill 1999]. This concept of the logistics postponement has been applied in practical operation of specific retail supply chains and generated the expected benefits.

3. The application of the logistics postponement strategy in a retail supply chain of Wal-Mart

The customers are the biggest drivers of the logistics postponement in a retail industry because they are not willing to wait for fast moving customer goods (FMCG) and they will buy another brand if a particular one is out of stock. It follows that customers are very sensitive to product availability and any reduction of safety stock will result in lower sales. Hence, if the managers want their retail supply chains to remain competitive, they should postpone the logistics activities in a distribution phase of product flow. It will enable to improve order, fill rates and keep inventory as low as possible without sacrificing service levels. As a result of customer demand, delivery lead time for most offered products can be compressed.

For the purpose of this paper the exemplary commercial organizations operating in the retail sector are examined. An example of the most known company that operates in the retail trade industry and successfully applied innovative logistics concepts is Wal-Mart. The company is a leader in its supply chain and widely implemented the logistics postponement strategy in its operations.

The logistics postponement turned out to be a very profitable concept in the American division of Wal-Mart as in the centralized distribution structures goods are

stored at a limited number of central locations and shipped to the retail outlets on the basis of actual orders. The distribution centre serves a several number of the retail outlets (Wal-Mart Stores, Super-centers and Neighborhood Markets). The emphasis in the Wal-Mart Stores is on frequently purchased goods at everyday low prices. The larger Supercenter hypermarkets add fresh foods. The Neighborhood Market stores provide a smaller food, pharmacy, health and beauty hybrid offering for convenience-oriented customers. This standardization of format types has facilitated the expansion and branding of Wal-Mart in the US market [Fernie, Arnold 2002, p. 92-102]. These three types of outlets are served by distribution centres (DCs), which play a crucial role in the application of the logistics postponement strategy. The position of the distribution centre in a structure of the Wal-Mart's retail supply chain is presented in Figure 2.

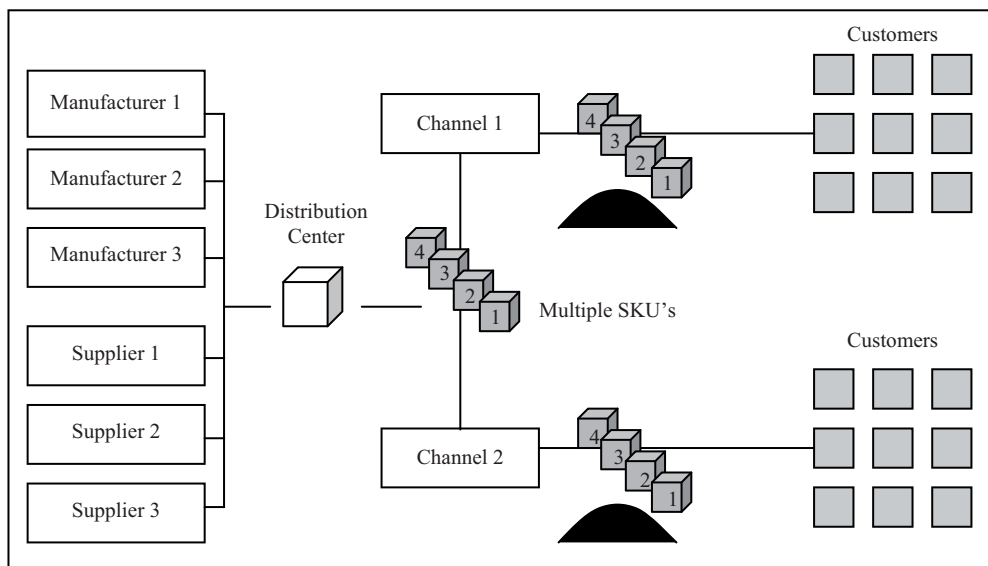


Fig. 2. The structure of the physical flow in a retail supply chain

Source: adapted from: [Johnson, Anderson 2000, p. 19-35].

The structure of a product flow in a retail supply chain presented in Figure 2 shows that the products are manufactured or delivered from suppliers to the distribution centre and later differentiated and configured to the channel customized offering. However, this is different to the traditional retail networks, as the Material Decoupling Point is moved more upstream in a supply chain and it is located in generic places of suppliers delivering products to DCs. From this point each delivery operation is purposefully delayed in a sense of time and stored at generic locations of suppliers. The activities are initiated when an order is received and a delivery is configured on the basis of a real customer demand.

The advantages of DC in Wal-Mart and obvious cost reduction are not achieved only in the result of the deliveries' consolidation. The operating of distribution centre in Wal-Mart enables to cut logistics costs and in the same time to increase the customer service level. Wal-Mart's prices are frequently lower than the wholesale prices. Low prices are possible because of competitive gross margins and high inventory turnover. The products are not stored in DCs but they are moved during 48 hours. DCs operate as nodes where the range and quantity of products are adjusted to the requirements of a specific retail outlet. This means that Wal-Mart has implemented a cross-docking technique which enables to rapidly consolidate shipments from disparate sources (manufacturers and suppliers) and realize economies of scale in outbound transportation from the distribution centre to the retail outlets. The technique of cross-docking eliminates the inventory-holding function of a warehouse while still allowing it to serve its consolidation and shipping functions. The idea is to transfer incoming shipments directly to outgoing trailers without storing them in between.

The successful implementation of the postponement strategy would not be possible without the support of information and communication technologies (ICT). The intensive development and use of ICT in Wal-Mart have a long history. In the early 1980s, Wal-Mart turned to technology, first for collecting and analyzing sales data and then for transmitting orders to suppliers with Electronic Data Interchange (EDI). By the 1990s Wal-Mart was collaborating electronically with thousands of its suppliers, using EDI initially and then developing its own applications, collectively known as Retail Linka [*The Wal Mart Story...* 2007]. The Wal-Mart's orientation on the advanced technologies brought the expected effects.

The efficiency of the Wal-Mart supply chain depends very much on the undistorted information flow among suppliers, producers, distribution centres and retail outlets. The real sales data obtained through the point-of-sale (POS) in the retail outlet are transferred directly to the supplier or producer which are responsible for the products' availability on the shelves – Figure 3.

As shown in Figure 3, the intensive use of information and communication technologies plays a crucial role in the application of the advanced and innovative solutions in the field of logistics. ICT enables to integrate geographically dispersed DCs and retail outlets. Wal-Mart uses a dedicated satellite network which is a key factor in its success in distributing goods to their stores. The POS terminals in each store are connected to an in-store micro or mini computer. The store computer is then connected to the satellite network and can be accessed directly by the corporate mainframe. The mainframe in the headquarters maintains all records of the current stock levels at each DC. Thus, purchase orders can be transmitted directly and accurately from the mainframe to the computers of the vendors [Chiu 1995]. On the basis of the real demand data the suppliers and manufacturers decide what quantity of products should be delivered to the specific store. It is a practical application of the vendor management inventory concept which is a means of optimizing supply chain performance. In this system the manufacturer or supplier which has access

to Wal-Mart's sales data is responsible for maintaining the distributor's inventory levels and for generating purchase orders. The frequency of deliveries to Wal-Mart distribution centres is twice a week in comparison to the deliveries one time a month in traditional retail networks. This concept is commonly known as a Continuous Replenishment and its objective is developing order fulfillment and delivery systems that will eliminate stock out situations in the retail outlets yet significantly reduce supply chain inventories [Coyle, Bardi, Langley 1996].

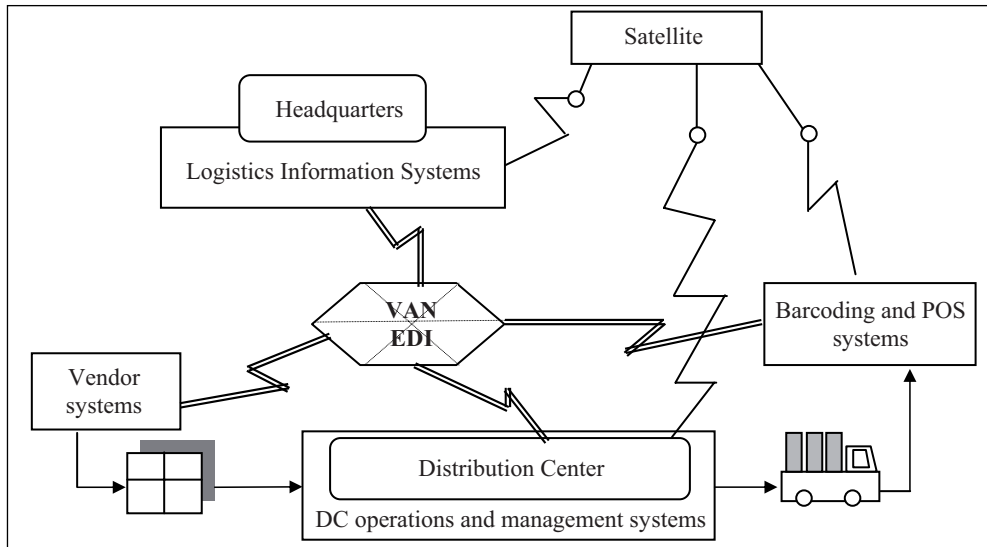


Fig. 3. The information and communication system in Wal-Mart

Source: [Chiu 1995].

As a general conclusion, it is interesting to observe that the application of the logistics postponement strategy has a positive impact on the development of supporting logistical techniques such as: Vendor Managed Inventory, Continuous Replenishment and cross docking. These operational concepts play a crucial role in achieving an efficient application of the logistics postponement strategy.

4. The effects of the logistics postponement and future implications in the retail supply chains

Both the ultimate customer and the supply chains reap the benefits of the application of the logistics postponement in the retail industry. The major advantage of the implementation of the logistics postponement concept for a company is achieving economies of scale and lowering the costs of operations (material handling, labour

costs, storage cost, etc.) through cutting down the costs of physical distribution. It is estimated that a cost reduction of operations in Wal-Mart is from 4 to 6 percent which annually ranges from 10 to 15 billion dollars.

The savings obtained through the application of a logistics postponement are reflected in lowering prices of products (which enables Wal-Mart's principle *everyday low prices* to come true) coupled with the increase in customer service level. The reduction of operational costs has contributed to lower prices for the customers. Lower prices also eliminate the expense of frequent sales promotions and sales are more predictable. The supply chain of Wal-Mart can overcome variations in demand and wide ranges of products or assortments required by customers. The ultimate purchasers have also benefited from greater choice and improved on-the-shelf availability, which is a primary standard of customer service in the retail industry.

The logistics postponement strategy enables companies to compress their product lead time. It means that goods are continuously delivered from distribution centres to stores within 48 hours and often without having to store them. This allows Wal-Mart to replenish the shelves 4 times faster than its competition. Wal-Mart's ability to replenish their shelves four times faster than its competition is a primary advantage they have over competition. The time of product flow from a supplier, through a distribution centre to the stores was reduced on average about 60 percent.

The benefits of the logistics postponement include faster inventory turnover, accurate forecasting of inventory levels, increased warehouse space, reduction in safety stock and better working capital utilization. The application of the logistics postponement also helped to reduce the dependency on the distribution centre management personnel resulting in the minimization of training costs and errors. The stock-out of goods and the subsequent loss arising out of it was completely eliminated [Chandran, Gupta 2003].

The benefits reaped through the application of the postponement strategy initiated the future phenomenon and processes whose tendencies can currently be observed.

One of the streams of research shows that the future trends of a logistics postponement in the retail supply chains are connected with the impact on third party service providers, whose role and significance have risen dramatically. It has resulted in a trend towards the use of third party providers for some postponement related activities and a growth in postponement services provided by specialized companies [Borne, Craighead, Hanna 2007, p. 594-611]. The current tendencies show that the outsourced operations are not limited to the classical logistics activities (i.e. transportation, warehousing, reloading, packaging, etc.), but also include issues related to the advanced ICT solutions (i.e. electronic tagging technology), supporting the efficient information flow.

Until the beginning of 2000, the suppliers of Wal-Mart mainly outsourced their transportation function to the service providers, whose role was to deliver products to Wal-Mart's distribution centre. They were still preparing a delivery and were responsible for its packaging and labeling. At the start of 2006, another 200 Wal-

Mart suppliers were expected to start tagging cartons and pallets of their products with a special electronic chip for delivery to the retailer's distribution centres in Texas. The electronic tags support information gathering in a product flow. Data put in a chip are read by special transponders located at the entrance and exit of the distribution centre. This system enables DCs to operate more efficiently and provides the necessary information for the realization of the logistics postponement strategy.

Wal-Mart's suppliers started to pass the responsibility of tagging the deliveries to the specialized parties. One logistics provider – food industry warehousing and distribution services company Atlas Cold Storage – is providing the electronic tagging as part of its service to one of those suppliers. Cases of products destined for Wal-Mart's DCs are brought on a pallet to Atlas' RFID station in Sikeston, Mo., where they are tagged manually and either returned to the storage freezer or shipped immediately. Atlas' customer tells the logistics provider which shipments require tagging, and the process takes place at a single Atlas facility, close to the receiving Wal-Mart DCs. This trend indicates a significant extension of the outsourced functions, including specific solutions supporting a practical use of the logistics postponement [*Atlas Cold Storage...* 2002-2006].

The tendency depending on the location of an additional service provider's facility close to the receiving point (Wal-Mart distribution centre) is also observed in a European retail industry. The retailers (i.e. Sainsbury's in the United Kingdom), which have achieved significant benefits by applying a logistics postponement strategy, are now encouraging third-party logistics providers to create multi-retailer relay centres near source transshipment points to serve the single retailer regional distribution centres. The aim is to take inventory out of the regional centres as the multi-retailer centres make more frequent deliveries possible without a corresponding increase in transportation costs [Ferrer, Fidlay 2003].

The other important tendency observed in Wal-Mart's operations is the modification of a cross-docking technique, due to suppliers' obligation to tag pallets and cases with electronic chips. Thus, the delivery consists of many tagged packs including collective items. The goods are already packed, labeled and tagged by service providers, and they are ready for shipment to the distribution centre from where it is sent to the store without opening the pack and repacking the goods. Goods received by a distribution centre or the store are directly sent into the outbound shipping truck, to be delivered to the customer, without altering the package. The observed modification in the performance of a basic technique of logistics postponement has been called pre-allocated cross-docking [Chandran, Gupta 2003].

5. Conclusions

The presented analysis of the logistics postponement in a retail supply chain of Wal-Mart proves that the organization as well as customers reaped the expected benefits of the concept. First, the logistics postponement decreased the operation costs in

companies, which then had a positive impact on establishing favourable prices for customers. The logistics postponement also improved conducted processes and activities in supply chains. The observed and predicted tendencies in the development of the logistics postponement are very promising and suggest it will further develop intensely.

However, it should be noted that the positive results obtained through the application of the logistics postponement in retail supply chains does not mean that it is a panacea for all companies in every environment. Before making a decision on the application of the concept, first it should be analyzed if the concept is actually necessary and if it helps to improve the market position of particular companies and the whole supply chain.

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ZASTOSOWANIE KONCEPCJI ODRACZANIA LOGISTYCZNEGO W ŁAŃCUCHU DOSTAW WAL-MART. OBECNE EFEKTY I PRZYSZŁE TENDENCJE

Streszczenie: Zastosowanie nowoczesnych koncepcji logistycznych wspieranych intensywnym wykorzystaniem zaawansowanej technologii informacyjno-komunikacyjnej umożliwi poprawę funkcjonowania łańcuchów dostaw. Pozytywny wpływ logistyki oraz innowacyjnych technologii na wyniki osiągane przez łańcuchy dostaw można zaobserwować w sektorze sprzedaży detalicznej.

Jedną z głównych koncepcji umożliwiających poprawę pozycji rynkowej łańcuchów dostaw funkcjonujących w sferze sprzedaży detalicznej jest odraczenie logistyczne. Praktyczne zastosowanie tej strategii doprowadziło do poprawy poziomu obsługi klienta, obniżenia kosztów operacji logistycznych oraz wzrostu przychodów. Aplikacja strategii odraczenia logistycznego powinna być wspierana wykorzystaniem operacyjnych technik logistycznych oraz nowo-czesnych technologii informacyjno-komunikacyjnych.

W artykule przedstawiono efekty dynamicznego rozwoju innowacyjnych koncepcji logistyki, w szczególności strategii odraczenia logistycznego wspieranej technologią informacyjną. Tekst prezentuje również główne tendencje, jakie w przyszłości mogą się pojawić i mieć wpływ na operacyjne środowisko funkcjonowania łańcuchów dostaw w sektorze sprzedaży detalicznej.